

## AN ADVENTIVE SPECIES OF *BRACHYDEUTERA* LOEW IN NORTH AMERICA (DIPTERA: EPHYDRIDAE)

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*Abstract.*—*Brachydeutera longipes* Hendel, a species previously known from the Orient, is reported to occur in eastern North America (Maryland south to Georgia). This is the 4th species of *Brachydeutera* for North America and the only adventive one in recent times. The natural history of the species, mostly based on published records from India, keys, a description, and illustrations are provided to facilitate identification and future research on the species.

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Publication of systematic studies frequently prompts additional research on the same taxa. Such was the beginning of the research reported here. Soon after revising the species of *Brachydeutera* from the Oriental, Australian, and oceanian regions (Mathis and Ghorpade, 1985) and publication of a smaller paper on North American species of the same genus (Mathis, 1983), one of us (WES) collected several specimens of a pale-colored congener from Georgia. Even without dissections, usually a requisite for species identification in this genus, the species was recognized as being new to North America. Unfortunately the specimens were females, which have not been studied as well and are not identifiable in some cases. Rummaging through newly collected material from Maryland, we then found additional females of what was apparently the same, pale-colored species, and on a subsequent field trip to North Carolina, WES succeeded in collecting a long series of both males and females of the same species. All specimens from the various localities were attracted to and collected at black lights in the early evening.

Unlike other species from the Western Hemisphere, these specimens are pale colored, especially the mesonotum, and the usual sharp demarcation between dark and pale coloration in the notopleural region is lacking. With careful study of the males from North Carolina, including dissection of their terminalia, this species proved to be *B. longipes* Hendel, a species known previously from the Orient. In this paper we report the occurrence, apparently adventive, of *B. longipes* in North America. Also provided is a key to North American species of *Brachydeutera*, a description and figures of *B. longipes* to facilitate its identification, and information on the natural history of the species.

### KEY TO NORTH AMERICAN SPECIES OF *Brachydeutera* LOEW

1. Brown color of mesonotum gradually becoming paler laterally, merging with pale gray pleural coloration (Maryland south to Georgia) . . . . . *B. longipes* Hendel
- Brown color of mesonotum continued ventrally to about dorsal  $\frac{1}{6}$ – $\frac{1}{3}$  of anepisternum, thereafter sharply delimited from pale gray coloration of ventral pleural areas . . . . . 2
2. Facial carina low, bluntly rounded, especially ventrally; male terminalia with epan-

- drium, in lateral view, evenly rounded, digitiform, in posterior view, narrowly rounded, not truncate; extended arm of gonite angulate, apex narrowly pointed (Texas to California, south into Mexico) ..... *B. sturtevantii* Wirth
- Facial carina high, sharply defined, especially ventrally ..... 3
3. Merger of fused surstyli with epandrium, in lateral view, indicated by an angulate emargination; gonite spatulate apically (Florida to Texas, southward throughout most of the neotropics) ..... *B. neotropica* Wirth
- Merger of fused surstyli with epandrium, in lateral view, broadly rounded; gonite digitiform apically, narrowly rounded (eastern North America; Michigan to Maine, south to Texas and Florida) ..... *B. argentata* (Walker)

*Brachydeutera longipes* Hendel

Figs. 1–3

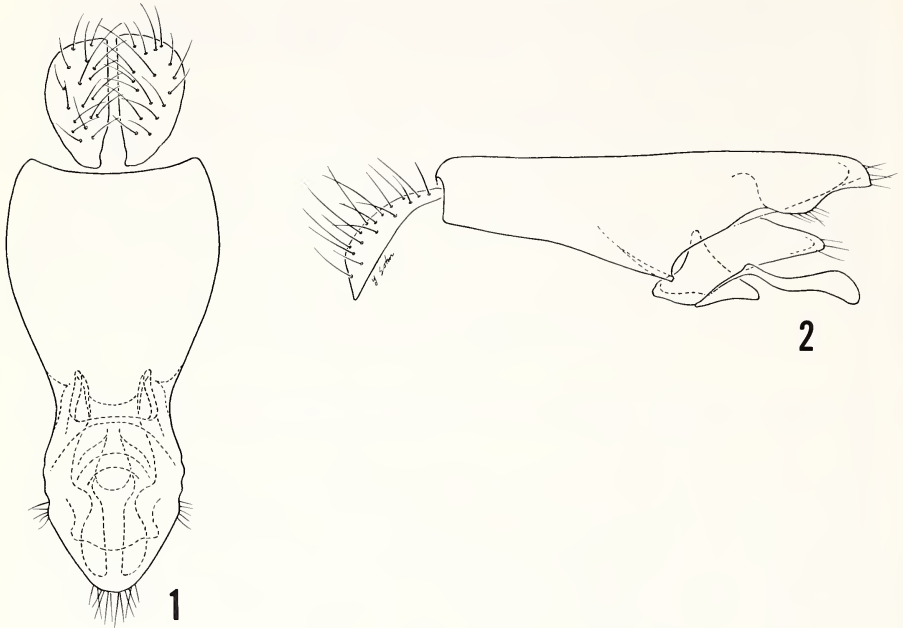
*Brachydeutera longipes* Hendel, 1913:99. Wirth, 1964:7 [revision]; Ramachandra Rao, 1970:354; Cogan and Wirth, 1977:337 [Oriental catalog]; Mathis and Ghorpade, 1985:15–18 [revision].

*Diagnosis.* Moderately small to medium-sized shore flies, length 2.10 to 3.15 mm.

Head: Frons mostly grayish brown to light brown, with faint olivaceous areas posterolaterad of ocelli; prominent, laterocline fronto-orbital bristles 3, anterior bristle weaker, about  $\frac{1}{2}$  length of posterior 2. Antenna brown, darker than frons; arisal branches 8–9. Facial carina wide, low, and rounded, weakly developed between antennae. Face, clypeus, and gena concolorous, pearly gray, facial carina and antennal fovea slightly darker, lightly tinged with faint olivaceous to grayish blue, extreme dorsum of facial carina sometimes faintly brownish. Palpus pale, yellowish.

Thorax: Mesonotal chaetotaxy comparatively poorly developed; bristles inconspicuous, setae of main setal tracks small. Mesonotum light brown to olivaceous gray, concolorous with frons, sometimes with darker brown stripes through setal tracks and with areas laterad of setal tracks more olivaceous gray, postpronotum and dorsum of scutellum mostly grayish. Scutellar ratio 0.85; apical bristles approximate, distance between them less than that between basolateral scutellar bristle and apical one. Anterior notopleural bristle present, although weaker than posterior one; katepisternal bristle present but very inconspicuous, pale, whitish. Light brownish coloration of mesonotum gradually merged with grayish coloration of pleural areas, notopleuron mostly light brownish, coloration sometimes extends to dorsolateral portions of anepisternum. Femora and tibiae yellowish, forefemur lacking sparsely microtomentose area anterodorsally toward base; tarsomeres brown to dark brown apically; male hindtibia lacking patch of ventral, long setae. Wing hyaline, clear;  $R_{2+3}$  moderately arched;  $R_{4+5}$  very slightly arched, nearly straight; costal vein ratio 3.10; M vein ratio 0.51.

Abdomen: Dorsum light brown anteriorly and medially, otherwise mostly gray; moderately microtomentose, mostly dull. Male terminalia (Figs. 1, 2) as follows: dorsal surface of epandrium in posterior view shallowly concave; epandrial width at dorsum extended laterally slightly beyond lateral margins of cerci; lateral margins of epandrium sinuate and more narrowed ventrally; epandrium + surstyli with lateral margins directed inward, apex narrowly rounded, broadly v-shaped, in lateral view



Figs. 1, 2. *Brachydeutera longipes*: 1. Cerci and epandrium (plus fused surstyli ?), posterior view. 2. Cerci, epandrium, and gonite, lateral view.

with anteroventral angle sharp, thereafter more or less evenly curved to epandrial connection except for a broad, bluntly rounded, setose process; gonite generally narrow, slightly enlarged apically, spatulate.

*Specimens examined from the Nearctic Region.* GEORGIA: Tattnall Co., Reidsville, Gordonia-Alatamaha State Park (at black light), Nov. 10, 1983, W. E. Steiner, A. G. Gerberich, and J. E. Lowry (12♀♀; USNM). MARYLAND: Montgomery Co., Silver Spring (at black light), July 31, 1984, W. E. Steiner and J. E. Lowry (1♀; USNM). Talbot Co., Wittman (at black light near open fields, mixed forest and tidal creek), Aug. 11–12, 1984, W. E. Steiner (5♀♀; USNM). NORTH CAROLINA: Columbus Co., Lake Waccamaw (at black light in sandy oak and pine forest near lake), Oct. 27–28, 1984, W. E. Steiner and A. G. Gerberich (36♂♂, 16♀♀; USNM).

*Distribution.* Iraq to Japan, south to Sri Lanka and Indonesia; eastern U.S. (Fig. 3) from Maryland to Georgia. This is the most widespread species of *Brachydeutera* in the Orient. Its distribution also extends northward into the eastern Palearctic Region (Japan: Kyoto). The locality from Iraq was not located on a map and is unconfirmed. The occurrence of this species in eastern North America apparently is an introduction. We suspect that eggs or immatures accompanied shipment of aquatic plant material to the U.S.

*Natural history.* In a series of papers, Venkatesh et al. (Venkatesh is the first author with different sets of coauthors; 1975, 1976, 1977, 1977, 1978, 1981) has reported

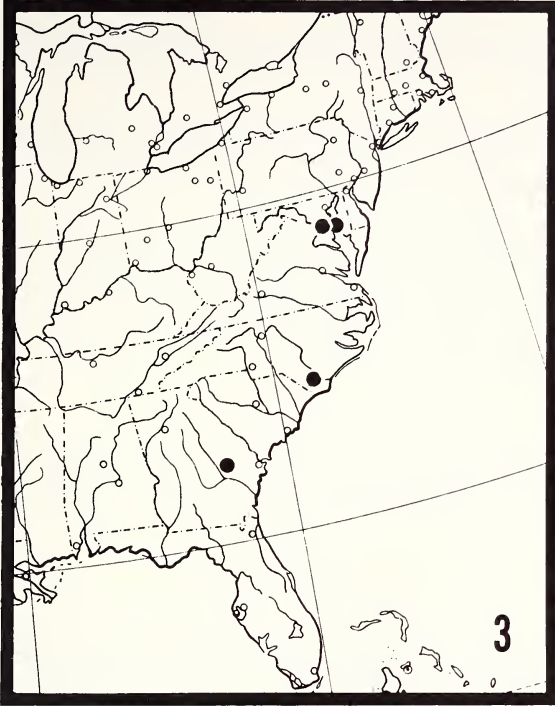


Fig. 3. Distribution map of *Brachydeutera longipes*.

on the feeding habits, behavior, and population ecology of *Brachydeutera longipes*. The summary here is largely extracted from their publications.

In India *B. longipes* is multivoltine. Gravid females oviposit on the water's surface or on moist substrates, and the developmental period, oviposition to adult, is from six to 20 days (egg 0.5–3 days; 1st instar larva 1–2 days; 2nd instar larva 1–4 days; 3rd instar larva 2–7 days; puparium 1–8 days), depending on temperature and humidity. Based on rearing experiments in the laboratory, length of the developmental period was found to be positively correlated with humidity but negatively correlated with temperature. Hence climatic and seasonal variation can greatly influence the rate of growth.

Although this species occurs in most aquatic or semiaquatic habitats, it is more abundant in relatively stable sites, those with permanent water sources, and where there is also considerable pollution and aquatic weeds. In rural India the fly was most abundant around open sewage; in urban areas the fly bred best in association with septic tanks. Along with *Tubifex* worms, the occurrence of larvae of *B. longipes* is used as an indicator of pollution in India.

The larvae *B. longipes* are epipelagic swimmers and feeders, and trophically there is some overlap and competition with larvae of the mosquito *Culex quinquefasciatus*



Say (as *C. fatigans* in most of the papers). Gut analysis revealed that larvae of *B. longipes* eat species of several genera of algae (*Chlamydomonas*, *Chlorella*, *Euglena*, *Scenedesmus*, and *Clathrocystis*) and some species of protozoan ciliates (*Frontonia* and *Tetrahymena*).

Adults of this species are attracted to lights, especially black lights. Many of the specimens we examined from the Oriental Region, were collected at light traps that were set out to sample mosquitoes. *Setacera* Cresson is the only other shore fly genus that we are aware of that is attracted to lights.

*Remarks.* The species can be distinguished by its lighter coloration, especially of the mesonotum, and by the presence of an anterior notopleural bristle. The anterior notopleural bristle is weaker than the posterior one but is still quite conspicuous. To distinguish *B. longipes* from *B. pleuralis* it is best to use characters of the male terminalia and perhaps the scutellar ratio.

#### ACKNOWLEDGMENTS

Special thanks are extended to Hollis B. Williams and Paul J. Spangler for reviewing a draft of this paper. Young Sohn carefully prepared the illustrations. We thank Andrew G. Gerberich and J. Elaine Lowry for assistance in collecting specimens.

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Received March 28, 1985; accepted June 18, 1985.